

Summary.

1. The patterns of the cubs of lions and pumas are specific characters. These species, usually described as uniformly coloured, were formerly marked as their cubs are marked and in no other way.
2. The pattern of lion cubs is intermediate between the spotted pattern of leopards or jaguars and the striped pattern of tigers.
3. From this it may be inferred that leopards (including jaguars), lions, and tigers are nearly related one to another.
4. On the assumption that spots preceded transverse stripes in evolution, it may also be inferred that the stripes of tigers originated from the fusion of rosettes into transverse chains, as Dr. Bonavia maintained.
5. The pattern of puma cubs affords no support to the belief that pumas are nearly allied either to leopards or lions.
6. Rather, in my opinion, does the pattern of puma cubs suggest that pumas may be regarded as large self-coloured representatives of one of the groups of smaller species of *Felis*, in the same way that lions may be regarded as large and otherwise modified representatives of a group exemplified by leopards.

EXPLANATION OF THE PLATES.

PLATE XIX.

Copy of a photograph of the dorsal view of a mounted lion cub in the collection of the Bristol Museum, showing the formation of transverse stripes from rosettes and attesting the relationship between lions and leopards on the one hand, and lions and tigers on the other.

PLATE XX.

Drawing of the flat skin of a newly born puma cub in the collection of the Zoological Society of London. The unshaded area on the fore part of the neck shows where the hair has been rubbed away. Since the tail was absent from this skin, the drawing of that organ was copied from the example in the Museum of the Clifton Zoological Gardens.

LXIII.—*Descriptions and Records of Bees.*—XVII.

By T. D. A. COCKERELL, University of Colorado.

Osmia fulgida, Cresson, 1864.

THIS species was described from the female. Mr. S. A. Rohwer collected five males at Florissant, Colorado, June 15 to July 6, 1907; one was at flowers of *Erigeron*. The male is about 9 mm. long, very bright green, the abdomen shining;

form very slender, with the abdomen long and parallel-sided; pubescence white throughout; scape green; flagellum long and slender, ferruginous, darkened above; apical dorsal segment concave above, its apex broadly snout-like, not at all notched; a small spine on each side of the penultimate segment.

Var. *a*.—Hind margins of abdominal segments narrowly brilliant purple; vertex suffusedly crimson and golden. One specimen, July 6.

By the narrow form and the structure of the abdomen, this species is allied to *Monumetha*, but the antennæ are normal for *Osmia*.

Osmia pentstemonis, Ckll., 1906.

Var. *a*. ♀.—Light hair of thorax strongly yellowish. Florissant, Colorado, at flowers of *Besseya plantaginea*, June 1, 1907 (*S. A. Rohwer*).

Osmia physariae, sp. n.

♂.—Length about $8\frac{1}{2}$ mm.

Blue-green, shining; head and thorax with copious long hair, which is faintly yellowish dorsally, but otherwise white, *with no dark hairs intermixed*; flagellum dark reddish and *very strongly crenulate beneath*; legs black, not at all metallic, their hair white, last tarsal joint ferruginous; form of tarsi normal; tegulæ piceous with a large green spot. Wings hyaline, a little dusky, but not at all reddish; b. n. meeting t.-n. Abdomen subglobose, with abundant dull white hair, which tends to form marginal bands; *sixth dorsal segment perfectly entire*; seventh bidentate; first ventral entire.

In the Florissant table of *Osmia* (Bull. Am. Mus. Nat. Hist. 1906) this runs to *O. faceta*, but that is very different by the black hair on the abdomen. In the Boulder County table (Univ. of Colo. Studies, 1907) it runs to *O. proxima*, but that is a smaller and otherwise different species. The antennæ suggest *O. chlorops*, but the flagellum is shorter, and the hind tarsi are different; the wings also are differently coloured.

Hab. Florissant, Colorado, at flowers of *Physaria*, June 1, 1907 (*S. A. Rohwer*).

Osmia seneciophila, sp. n.

♂.—Length 9 mm.

Head and thorax very dark dull blue, a little greenish on scutellum; abdomen shining indigo-blue, closely punctured; hair of head and thorax white; hair of cheeks white, except just behind the eyes, where it is long and black; extreme sides of vertex with a few black hairs, and even a very few

on front; flagellum long, dark, submoniliform; legs black, not metallic, their hair partly black and partly pale; tarsi normal, but the last joint red and rather elongate. Wings hyaline, a little stained along the veins. Abdomen subglobose, hind margins of segments very narrowly reddish; third and following segments with short black hair; sixth with a small notch; seventh bidentate; first ventral normal; *third ventral with a semicircle of long pale orange hairs in the median emargination*; fourth broadly elevated in the middle, the long margin of the elevation ciliate with black hairs.

In the Florissant table runs to *O. faceta*, and it agrees with certain Rocky Mountain males which I have called *faceta*; but the real *faceta* is a steel-blue insect allied to *O. chalybia*. In the Boulder County table it runs to *O. aprilina*, which is, however, a smaller species, with the hair a different colour and the flagellum not submoniliform. Disregarding the few black hairs at sides of vertex, it runs to *Wheeleri* and *cyaneonitens*. *O. Wheeleri* is easily separated from it by the absence of the peculiar characters of the third and fourth ventral segments, as well as the narrower form and different colour of the abdomen; *O. cyaneonitens* is considerably larger, and also lacks the semicircle of orange hairs on the under side of the abdomen.

Hab. Florissant, Colorado (type-locality), at flowers of *Senecio tridenticulata*, June 26 (*S. A. Rohwer*). Top of Las Vegas Range, New Mexico, 11,000 ft., June 28 (*Cockerell*).

Osmia amala, sp. n.*

♂.—Length about 9 mm.

Head and thorax very densely punctured, but glittering, dark blue, giving way to green on clypeus and mesothorax; abdomen broad-ovate, brilliant purple-blue, the hind margins of the segments narrowly rufous; legs black, without metallic tints; hair of head and thorax dull white, with no dark intermixed on thorax above; hair of cheeks black, and a few black hairs on extreme sides of vertex; hair on pleura white, but just under the wings, and posteriorly on sides of metathorax, it is black; clypeus normal; antennæ wholly dark, flagellum very long, not at all crenulate or moniliform. Wings hyaline; b. n. meeting t.-m. Hair of legs partly pale and partly dark; hind femora with scattered black hairs; hair on inner side of hind basitarsus very dark purplish fuscous. Sixth dorsal segment of abdomen entire, not at all produced; seventh bidentate, with a brush of black hair beneath each tooth; first ventral not emarginate; second

* *Amala*, a Malayan word for blue.

ventral and sides of third with fringes of long black hair ; emargination of third with short whitish hair.

In the Florissant table runs to *O. faceta*, but differs by the non-moniliform antennæ and other characters. In the Boulder County table runs to *O. viridior*, but is much smaller and of a different colour. Disregarding the few black hairs at sides of vertex, it runs to *O. Wheeleri*, which it closely resembles ; but it is easily known from *Wheeleri* by the black hair at sides of metathorax, structure of apex of abdomen, &c. The first two small joints of the middle tarsi are swollen, as in *O. universitatis* and *integrella*: *universitatis* has the hair on the sides of the metathorax light and the abdomen greenish ; *integrella* is considerably larger than *amala* and the abdomen is of a very different colour. In size and the colour of the abdomen *O. amala* resembles *O. coloradella*.

Hab. Florissant, Colorado, June 30, 1907 (*S. A. Rohwer*).

Osmia mertensiae, sp. n.

♂.—Length about 8 mm.

Head and thorax green, glittering ; abdomen deep blue-green, very shiny, the hind margins of the segments concolorous ; legs strongly tinged with green ; hair of head and thorax long and white ; no dark hairs on thorax, but a few long dark hairs on anterior part of cheeks ; hair of legs pale, with some black intermixed ; hair of hind femora partly pale and partly dark ; clypeus normal, covered with a dense brush of hair ; flagellum only moderately long, not at all moniliform, ferruginous beneath ; wings strongly dusky ; tarsi normal. Abdomen with short black hair beyond second segment ; sixth notched ; seventh bidentate ; venter normal.

In the Florissant table runs to *O. Wheeleri*, of which it may possibly be a variety, but the antennæ are differently coloured, and the sixth abdominal segment is only feebly notched, and does not bulge at the sides as it does in *Wheeleri*. In the Boulder County table it runs to *O. aprilina*, but that has the pubescence, antennæ, &c. quite different. The vertex of *mertensiae* not only shows some black hairs at the sides, but there are black hairs about the ocelli.

Hab. Florissant, Colorado, at flowers of *Mertensia lanceolata*, June 19, 1907 (*S. A. Rohwer*).

Osmia enena, sp. n.*

♂.—Length about 9 mm.

Dark blue. Superficially similar to *O. mertensiae*, but differing thus : antennæ considerably longer, the flagellum

* *Enena*, a Malay word meaning small.

faintly brownish beneath, but quite dark; legs not metallic; abdomen narrower and less shining; marginal cell longer and narrower apically. The head is rather large; there are dark hairs about the ocelli; the thorax is wholly without dark hair. There is a dark stain at the apex of the marginal cell. Notch in sixth abdominal segment strong.

In the Florissant table it runs to *O. fuceta*, but differs in the antennæ, &c. Compared with *O. Wheeleri*, the abdomen is duller and the sixth segment differently shaped. The clypeus is practically black; in *Wheeleri* it is blue-green. In the Boulder County table, *O. enena* runs to *aprilina*, from which it differs in the form of the abdomen, the colour of the pubescence, &c.

Hab. Florissant, Colorado, June 23, 1907 (*S. A. Rohwer*).

Osmia vallicola, sp. n.

♂.—Length about 8 mm.

Superficially similar to *O. mertensiae*, but smaller, with the flagellum wholly dark, the apical tooth of mandibles longer, the head and thorax greenish blue; the vertex, front, and thorax above with scattered very long black hairs; upper part of pleura with the hair black; marginal cell longer; second submarginal cell very long. The legs are strongly metallic; the abdomen is very shiny, and of the same tint as that of *mertensiae*; sixth segment rather feebly notched; venter and tarsi normal.

In the Florissant table runs to 3, and runs out because of hair of pleura half black and half light. In the Boulder County table it runs to *O. propinqua*, but the flagellum is not moniliform, and there are many other differences. (*O. propinqua* does occur at Florissant, both sexes having been taken by Mr. Rohwer from flowers of *Salix brachycarpa*, June 11, 1907.)

Hab. Florissant, Colorado, at flowers of *Ribes vallicola*, June 11, 1907 (*S. A. Rohwer*).

Osmia nigrifrons, Cresson, 1878.

Three females at flowers of *Senecio tridenticulatus*, Florissant, Colo., June 14, 1907 (*S. A. Rohwer*).

Osmia Wheeleri, Ckll., 1906.

One male at flowers of *Castilleja integra*, Florissant, Colo., June 23, 1907 (*S. A. Rohwer*).

Osmia florissanticola, Ckll., 1906.

Two females at flowers of *Aragallus Lamberti* (sens. lat.), Florissant, Colo., June 1907 (*T. D. A. Cockerell*).

Osmia subtrevoris, Ckll., 1906.Florissant, Colo., June 16, 1907 (*S. A. Rohwer*).*Sphecodes (Machæris) Rohveri*, sp. n.

♀.—Length a little over 5 mm.

Head and thorax black, shining, with white hair, *which is not at all infuscated dorsally*; head transverse, front very densely punctured, flagellum thick, testaceous beneath; mandibles simple, ferruginous except at extreme base; disk of mesothorax with strong punctures, *about as close though perhaps not quite so large* as in *S. Cressonii* (the thorax itself is smaller than in *Cressonii*, and not quite the same tint, appearing a sort of blue-black by contrast); area of metathorax semilunar, well defined, *with strong radiating ridges*; tegulae rufo-testaceous; *wings dusky reddish*; tarsi dark brown, with glittering hairs. Abdomen shining, of a yellow red than that of *S. eustictus*, the red including only the first three segments (but these without black), the fourth and following black; second and third segments punctured basally.

Close to *S. stygius*, Rob., from Illinois, but separable by the characters italicised.

Hab. Florissant, Colorado, at flowers of *Salix brachycarpa*, July 7, 1907 (*S. A. Rohwer*). Mr. Rohwer also took *Proteraner rhois*, Ckll., and *Sphecodes Sophie*, Ckll., at the flowers of the same species of *Salix*, at Florissant, the first June 2, the second June 6.

While on the subject of *Sphecodes*, I take the opportunity to offer a table of the larger species more or less like *S. dichrous*. Many of these are very much alike superficially, and are not easy to recognize without a table. The table is based on females.

When the abdomen is looked at from the side, a strong constriction is seen dorsally at the base of the second segment; punctures of mesothorax strong and dense; area with strong longitudinal ridges

pecosensis, Ckll.

When the abdomen is looked at from the side, the constriction is seen to be feeble or absent

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|---|----|
| 1. First abdominal segment with a blackish discal spot; disk of mesothorax shining, with the punctures widely separated . . | 1. |
| First abdominal segment without a blackish discal spot | 2. |
| 2. Area of metathorax with widely separated longitudinal ridges and a few cross ones; abdomen distinctly but not at all closely | 3. |

- punctured, first segment very sparsely punctured. *dichrous*, Smith.
- Area subcancellate with irregular wrinkles (male abdomen largely red) *hesperellus*, Ckll.
3. First abdominal segment with the apical half very distinctly and rather closely punctured; area irregularly wrinkled; mesothorax rather more densely punctured than in *dichrous*; abdomen broad, the apex hardly at all blackish. *arvensis*, Patt., Rob.
- First abdominal segment with very sparse (sometimes hardly any) punctures 4.
4. Second abdominal segment, beyond the base, with very fine, relatively close, regular punctures 5.
- Second abdominal segment, beyond the base, with very sparse punctures 6.
5. Abdomen broad, chestnut colour; wings very dark and very yellow. *arvensiformis*, Ckll.
- Abdomen narrower, paler, the last segment blackened; wings hyaline, the apical half smoky, but not yellowish; aspect of *S. columbica* *lautus*, Lovell & Ckll.
6. Apex of abdomen broadly blackish. 7.
- Apex scarcely or not blackish 8.
7. Larger; mesothorax very shiny; wings hyaline *olympicus*, Ckll.
- Smaller; mesothorax duller; wings with a strong reddish suffusion *obscurans*, Lovell & Ckll.
8. Face with a little white hair, but principally coarse black bristles; abdomen long and pale; mesothorax densely punctured, the posterior middle sparsely *columbica*, Ckll.
- Face with hoary white hair 9.
9. Mesothorax smaller, very shiny, less densely punctured, the median sulcus evident *arroyanus*, Ckll.
- Mesothorax larger, duller, more densely punctured, the median sulcus not or hardly evident *persimilis*, Lovell & Ckll.

The three species of Lovell and Cockerell are from Maine, and are described in a paper which has been sent to 'Psyche' for publication.

Halictus scrophulariae, Ckll., 1906.

Mr. S. A. Rohwer took 17 females at Florissant in June 1907; of these, 15 were at flowers of *Salix brachycarpa*, one at *Ribes vallicola*, and one at *Taraxacum taraxacum*. The thorax varies from blue-green to brassy green.

Andrena Porteræ, Ckll., 1900.

Florissant, 7 females, June 16, 1907 (*S. A. Rohwer*). Five were at *Ribes longiflorum* *, two at *R. pumilum*.

* The mountain form of *R. longiflorum* is *R. leiobotrys*, Kœhne, as I learn from Dr. N. L. Britton. I understand that it will be regarded as distinct in a forthcoming part of 'North American Flora.'